Claims

1. In a scanning magnetism detector comprising a probe that measures a surface condition of a magnetic substance by responding to a tunnel current of spin-polarized conduction electrons flowing between the probe and the magnetic substance, the improvement comprising:

a probe formed of a solid material having electrical conductivity and spin polarization properties, the probe including a forefront portion that, when positioned in proximity to a surface of the magnetic substance, causes tunnel current flow between the probe and the surface of the magnetic substance and thereby enables detection of the surface condition of the magnetic substance essentially undistorted by its magnetic condition.

2. A scanning magnetism detector according to claim 1, wherein the solid material is a single crystal material having a zinc-blende crystal structure.

3. A scanning magnetism detector according to claim 2, wherein the solid material is at least one material selected from the group consisting of CuF, CuCl, AgI, ZnS, ZnSe, CdS, CdSe, BP, AlAs, AlP, AlSb, GaN, GaP, GaAs, GaSb, InAs, InP, InSb, and SiC.

4. A scanning magnetism detector according to claim 2, wherein the solid material is a BN single crystal, and in which a crystal lattice site of the solid material is replaced by a donor element.

5. A scanning magnetism detector according to claim 1, wherein the solid material is a single crystal material having a diamond crystal structure.

6. A scanning magnetism detector according to claim 5, wherein the solid material is at least one material selected from the group consisting of Si, Ge, and Sn.

7. A scanning magnetism detector according to claim 5, wherein the solid material is a carbon single crystal, and in which a crystal lattice site of the carbon single crystal is replaced by a donor element.

8. A scanning magnetism detector according to claims 2, 3, 4, 5, 6, or 7, wherein the probe is of substantially pyramidal shape.

9. A scanning magnetism detector according to claim 1, wherein each dimension of the probe is at most 10 nm.

10. A scanning magnetism detector according to claim 2, wherein the probe is formed with a cleaved bulky single crystal.

11. A scanning magnetism detector according to claim 5, wherein the probe is formed with a cleaved bulky single crystal.

12. A scanning tunnel electron microprobe comprising a scanning magnetism detector according to claims 1, 2, 3, 4, 5, 6, 7, or 8.

13. A probe for a scanning magnetism detector, the probe comprising a solid material having electrical conductivity and spin polarization properties, and the probe including a forefront portion that, when positioned in proximity to a surface of a magnetic substance, causes tunnel current flow between the probe and the surface of the magnetic substance and thereby enables detection of the surface condition of the magnetic substance essentially undistorted by its magnetic condition.

14. A probe according to claim 13, wherein the solid material is a single crystal material having a zinc-blende crystal structure.

15. A probe according to claim 14, wherein the solid material is at least one material selected from the group consisting of CuF, CuCl, AgI, ZnS, ZnSe, CdS, CdSe, BP, AlAs, AlP, AlSb, GaN, GaP, GaAs, GaSb, InAs, InP, InSb, and SiC.

16. A probe according to claim 14, wherein the solid material is a BN single crystal, and in which a crystal lattice site of the BN single crystal is replaced by a donor element.

17. A probe according to claim 13, wherein the solid material is a single crystal material having a diamond crystal structure.

18. A probe according to claim 17, wherein the solid material is at least one material selected from the group consisting of Si, Ge and Sn.

19. A probe according to claim 17, wherein the solid material is a carbon single crystal, and in which a crystal lattice site is replaced by a donor element.

20. A probe according to claim 13, wherein the probe is of substantially pyramidal shape.

21. A probe according to claim 13, wherein each dimension of the probe is at most 10 nm.

22. A probe according to claim 14, wherein the probe is formed with a cleaved bulky single crystal.

23. A probe according to claim 17, wherein the probe is formed with a cleaved bulky single crystal.